

FIG. 1

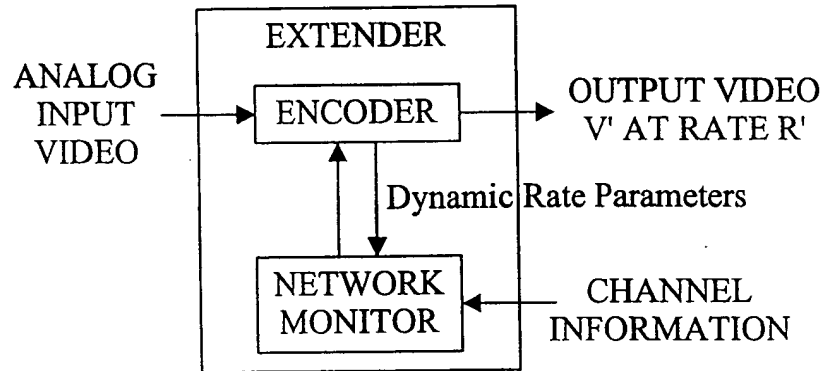


FIG. 2

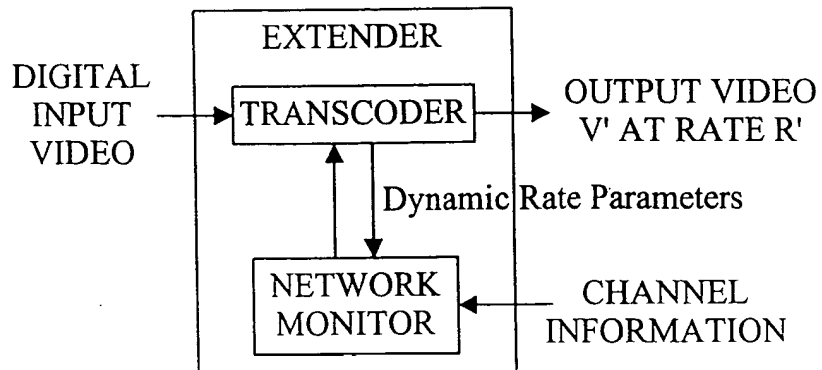


FIG. 3

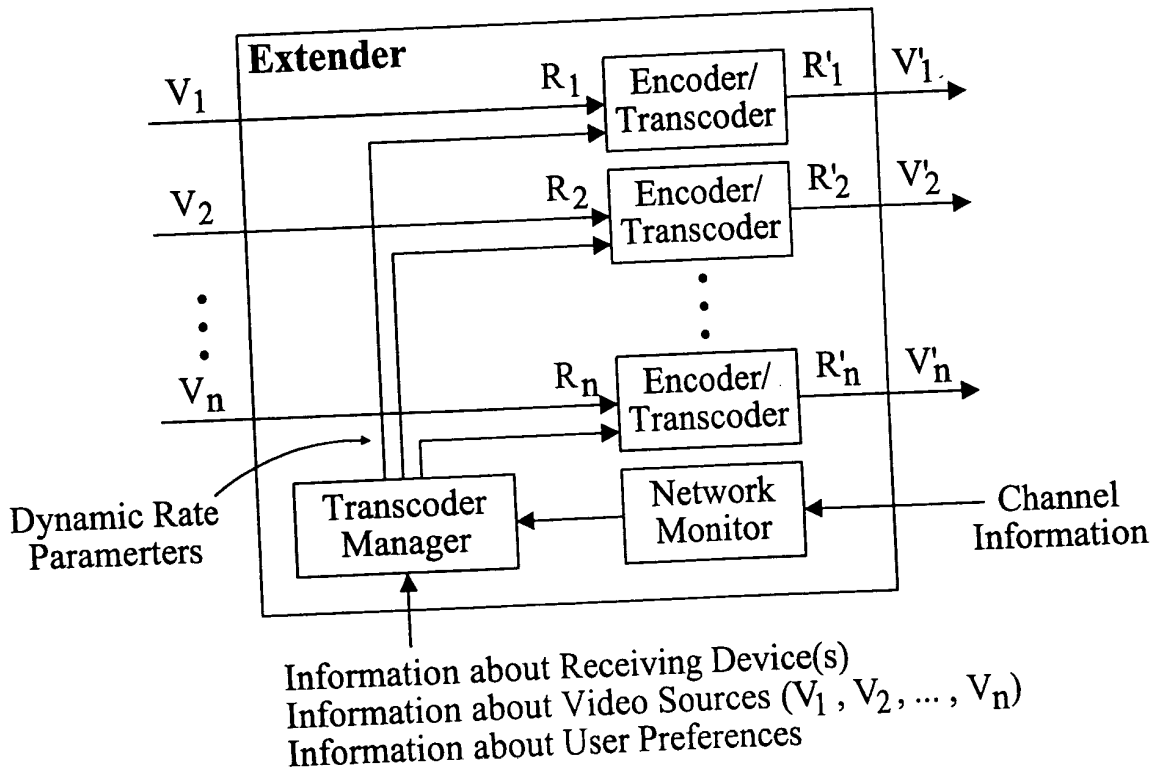
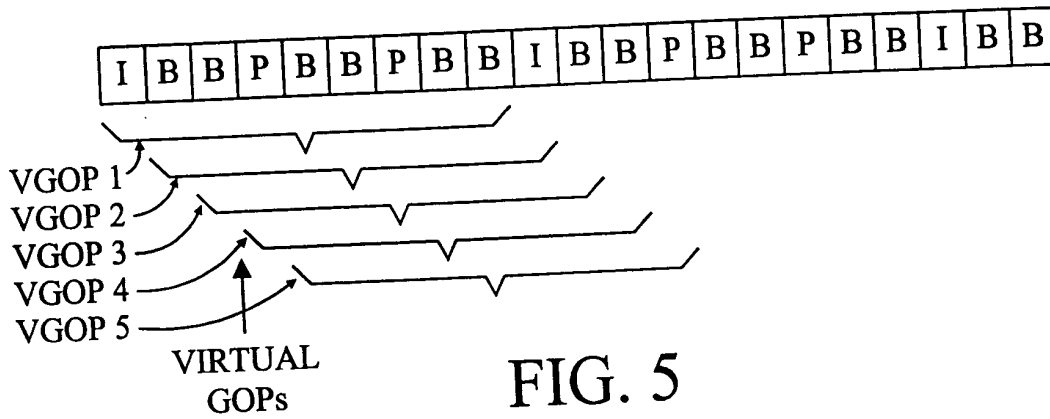
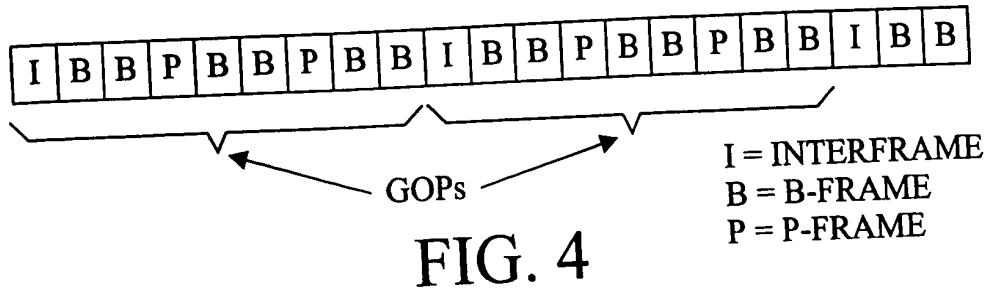




FIG. 7



FIG. 8

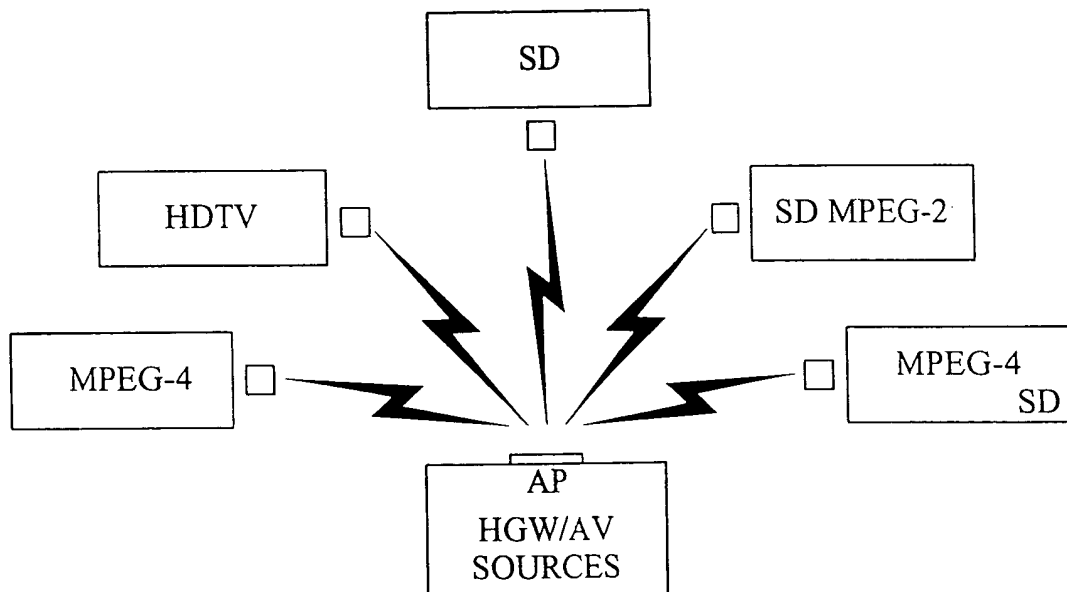


FIG. 9

(MPEG-2 TM5):

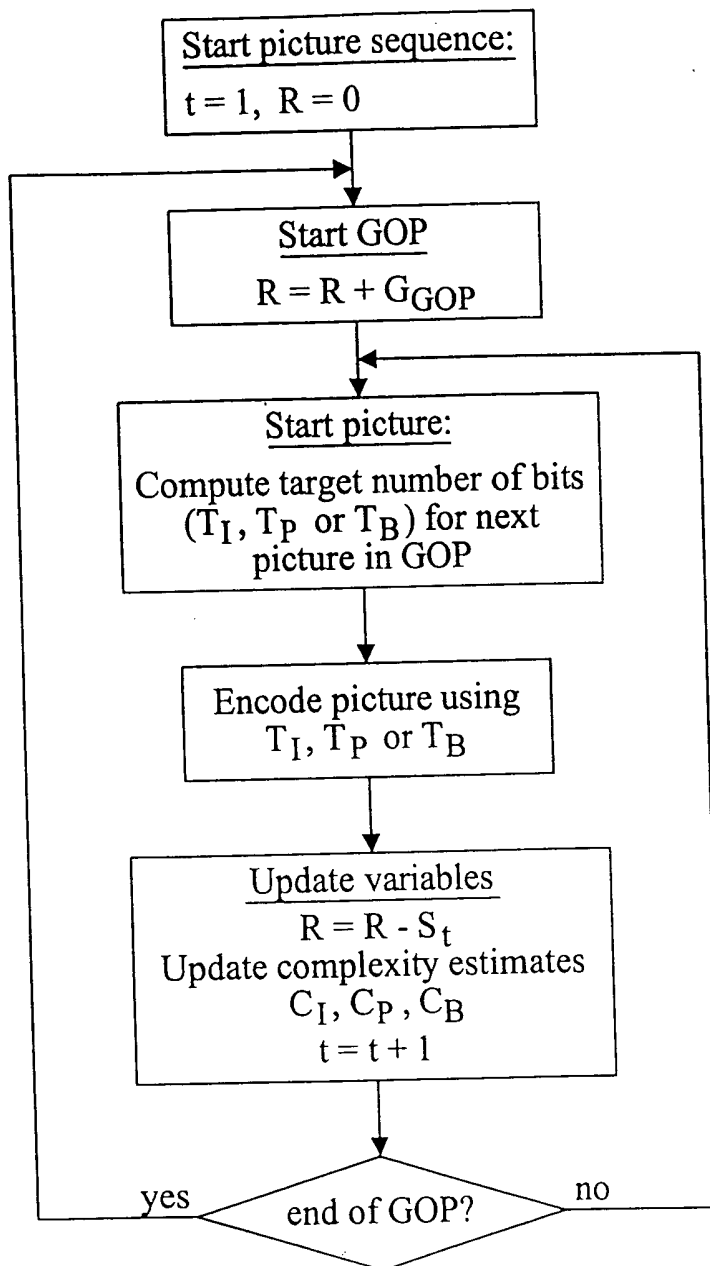


FIG. 10

## Dynamic rate adaptation with Virtual GOPs (VGOPs)

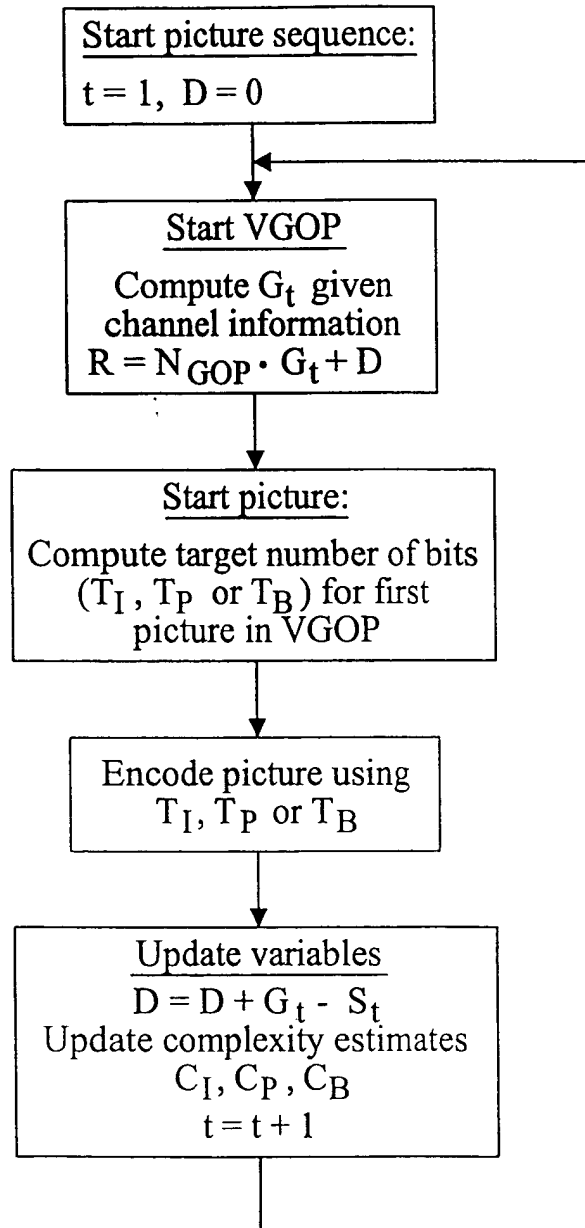


FIG. 11

No or slowly varying channel conditions -  
super-GOP-by-GOP bit allocation (MPEG-2)

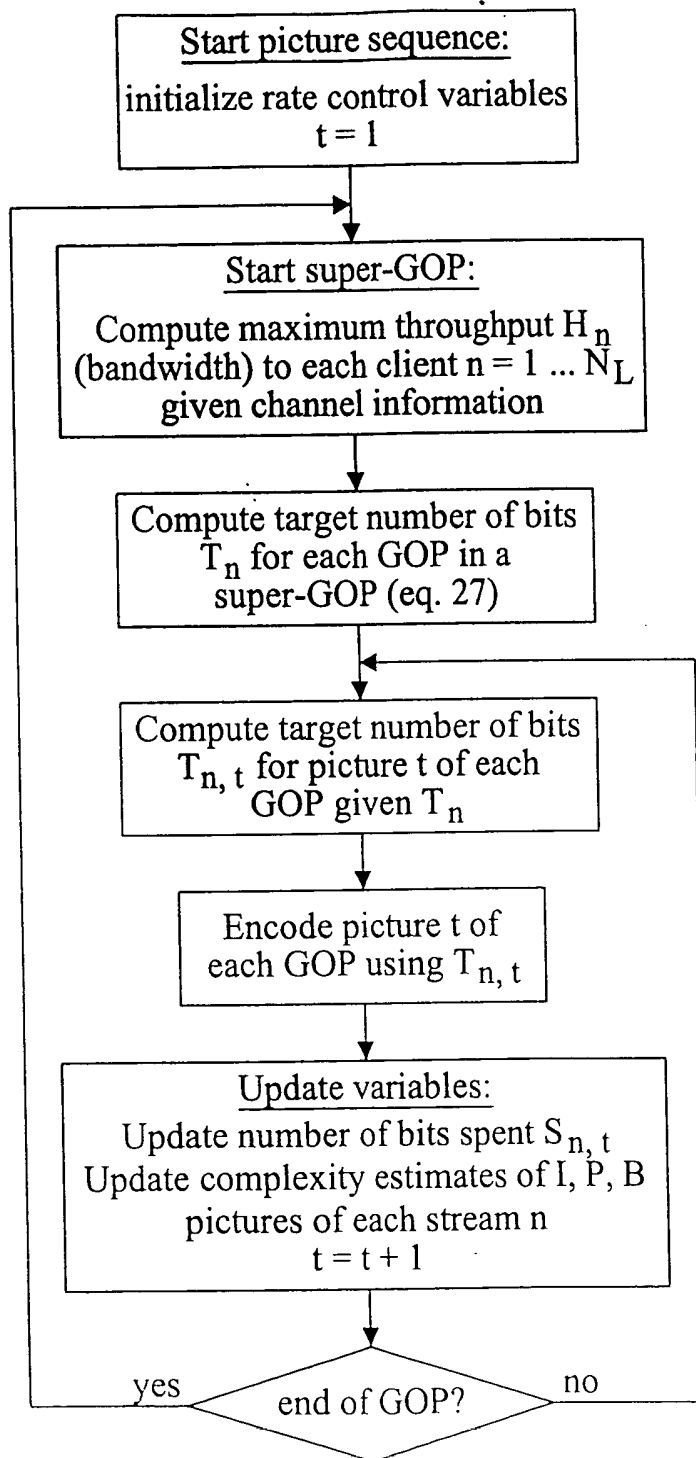


FIG. 12

# Dynamic channel conditions - virtual-super-GOP-by-virtual-super-GOP bit allocation

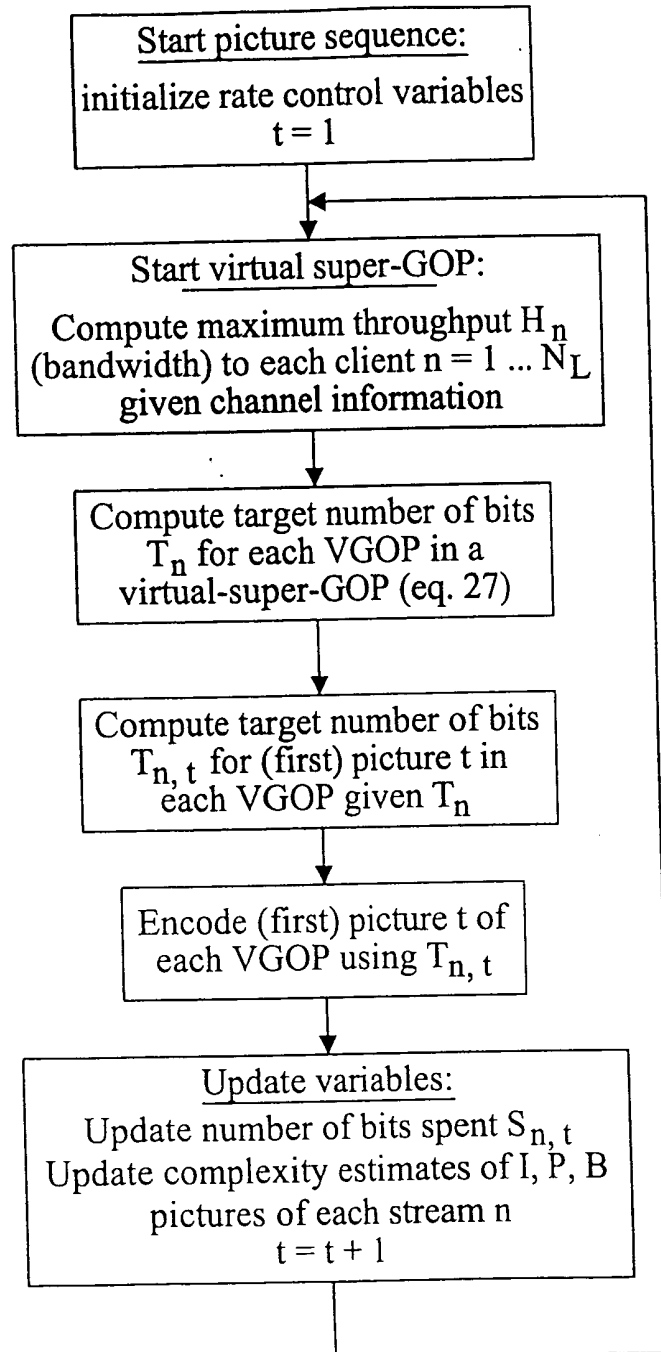


FIG. 13

Dynamic channel conditions -  
super-frame-by-super-frame bit allocation (no GOPs)

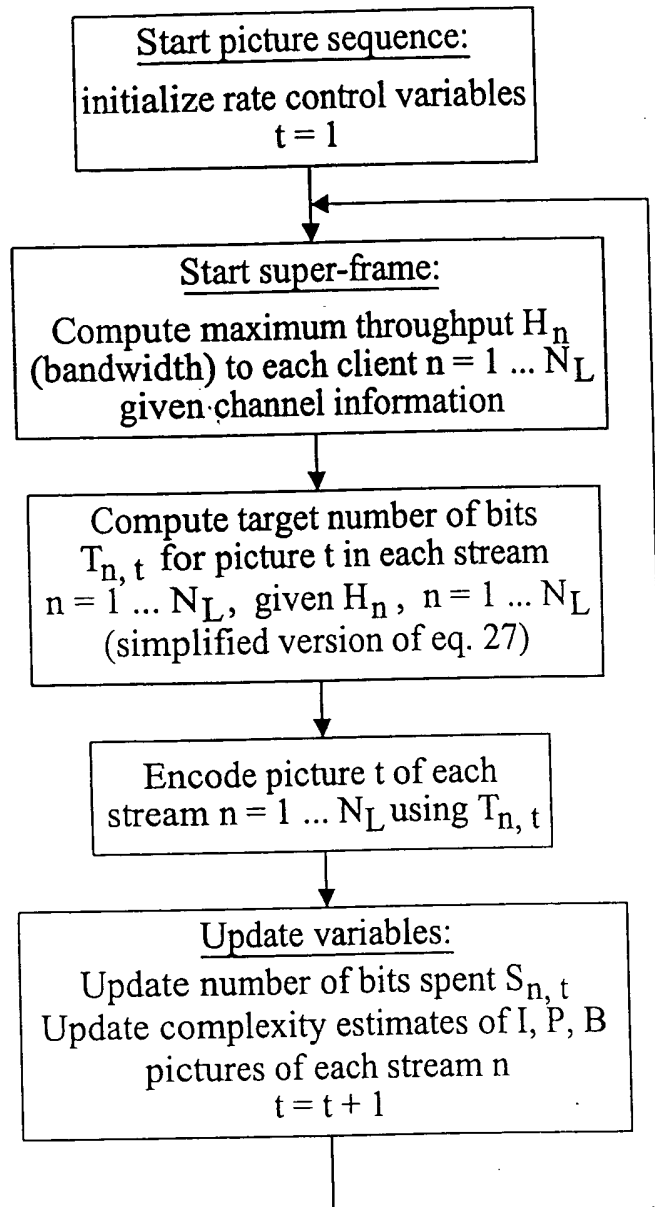


FIG. 14



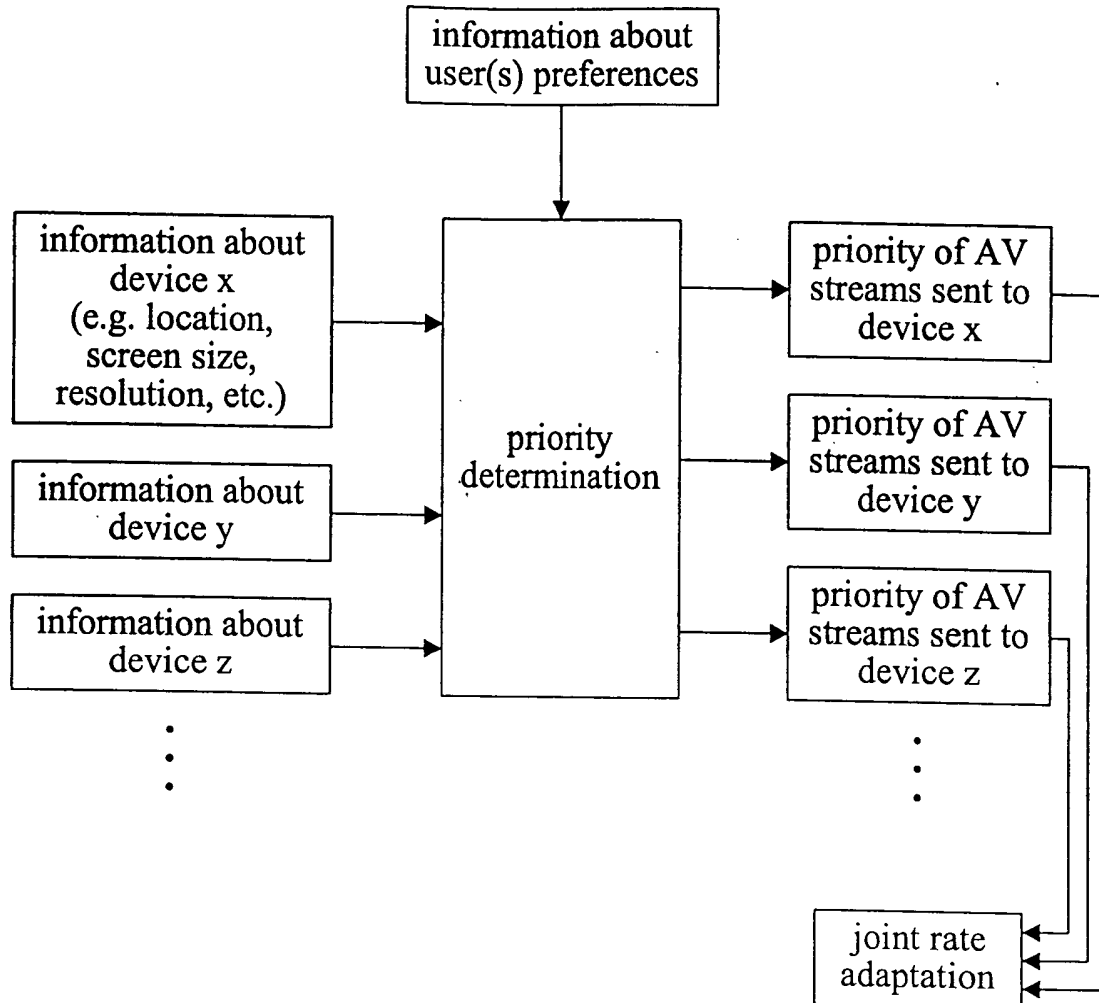


FIG. 15

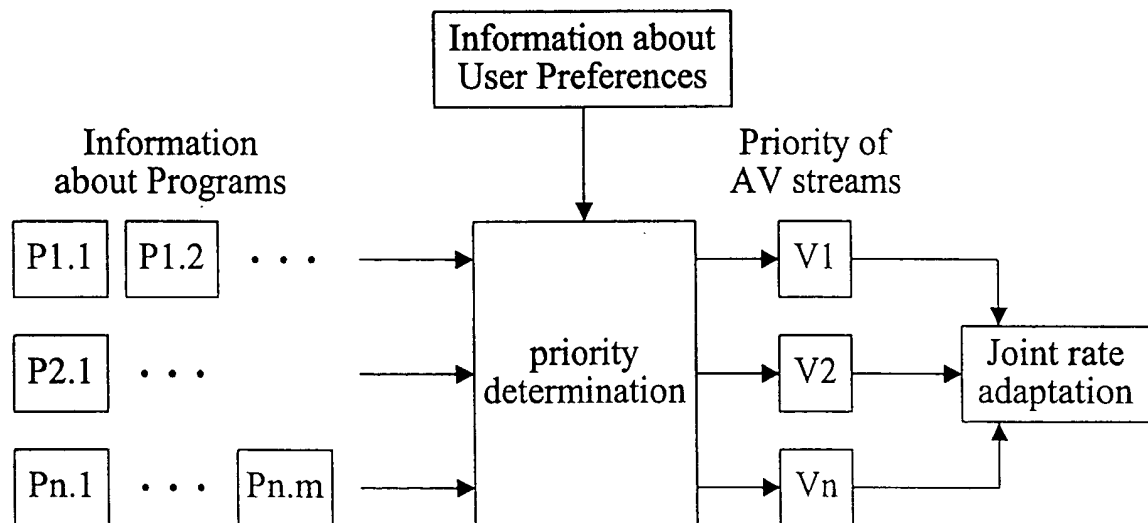
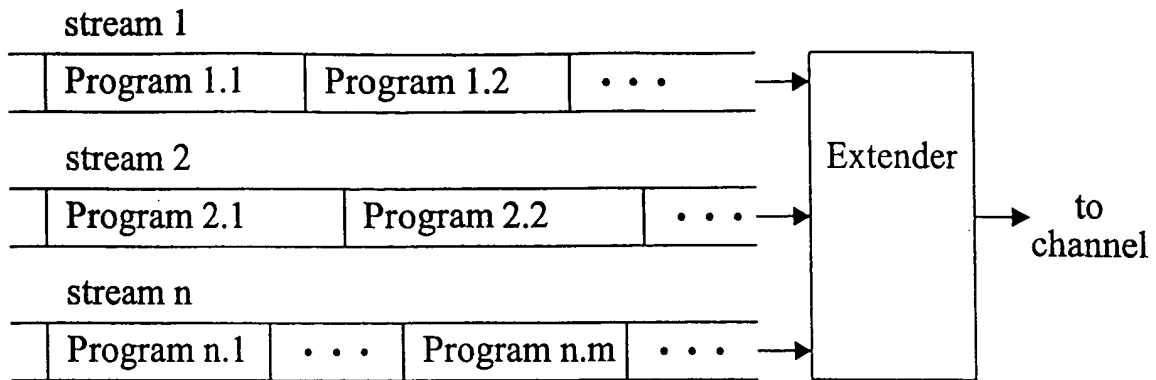


FIG. 16

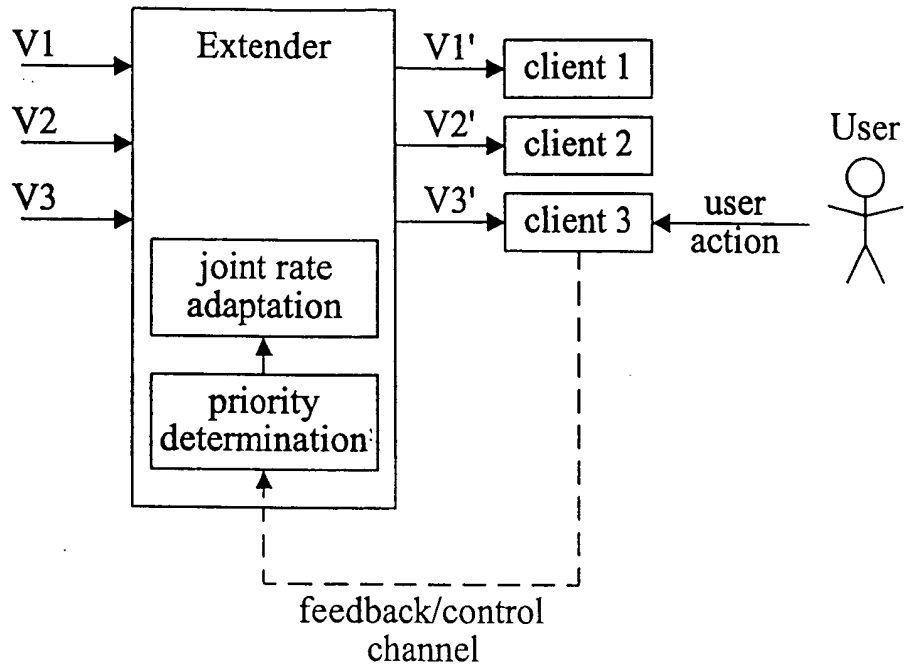


FIG. 17

# Idealized model of MAC (using 802.11 DCF)

• Channel condition deterioration will cause:

- Re-transmissions of lost packets
- Fallback to lower data link rates

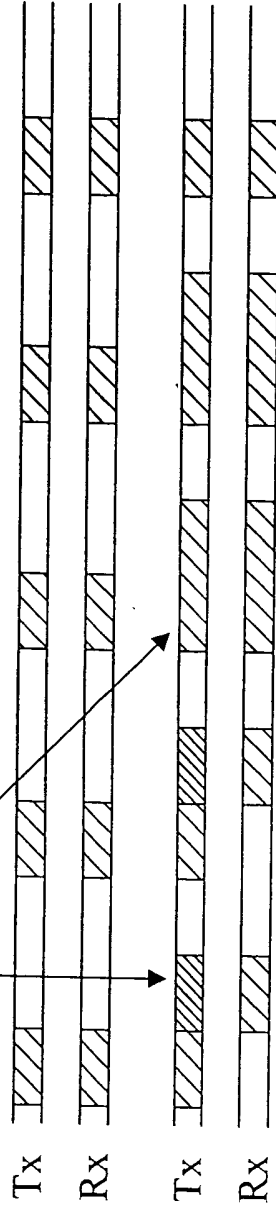


FIG. 18

## A model-based approach at the video layer (1 stream case)

- Measure packet transmission and arrival times:
- Measurements by application/video layer (outside MAC)
- Variation in packet arrival times indicate changes of data link rate and retransmissions

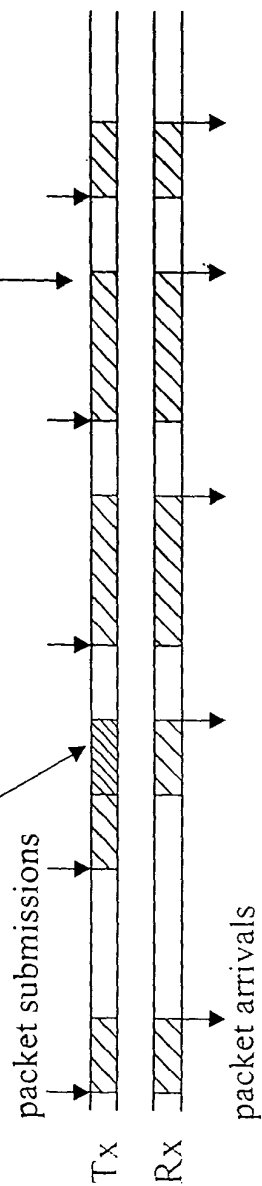


FIG. 19

- Packet burst approach

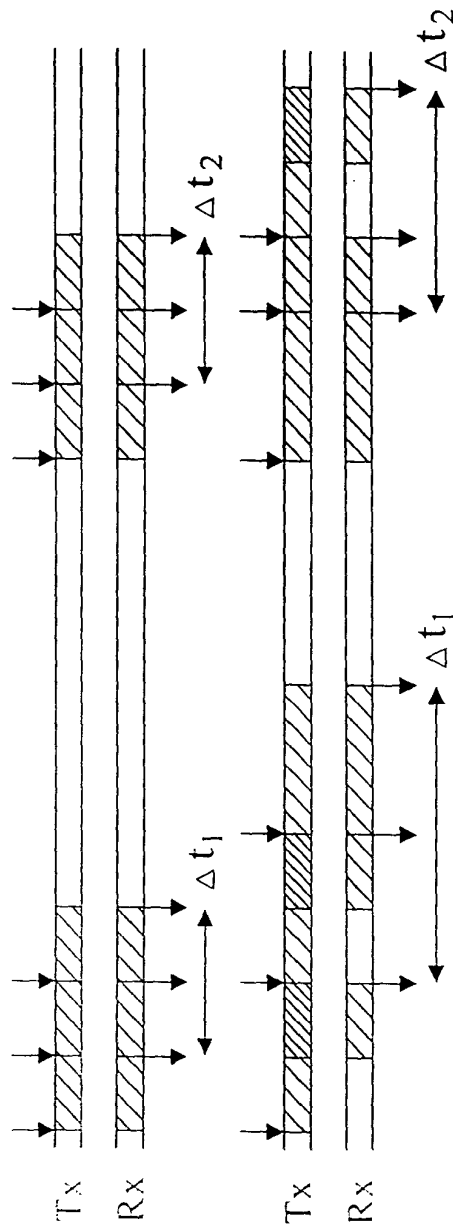


FIG. 20

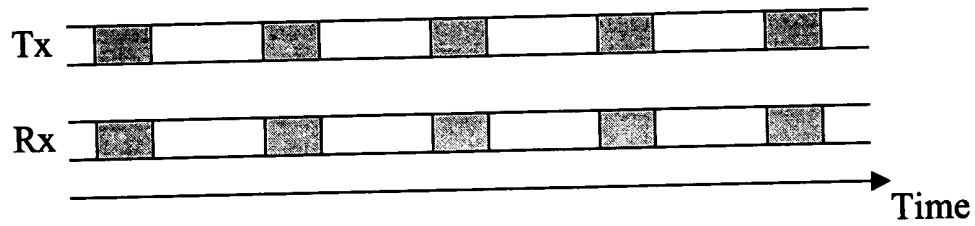


FIG. 21

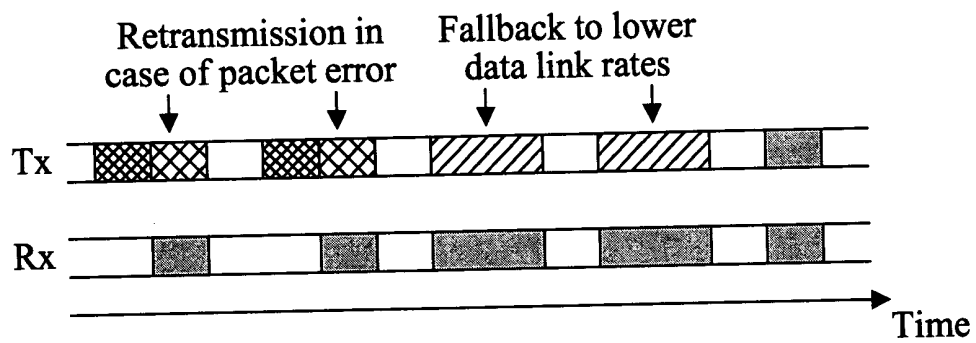


FIG. 22

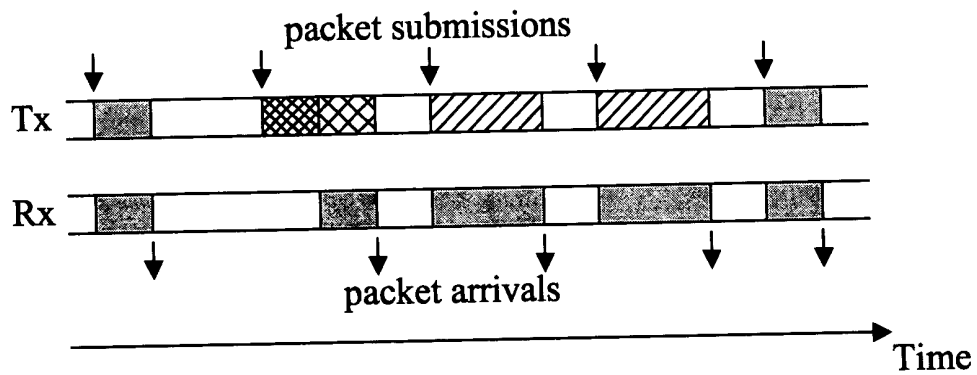


FIG. 23

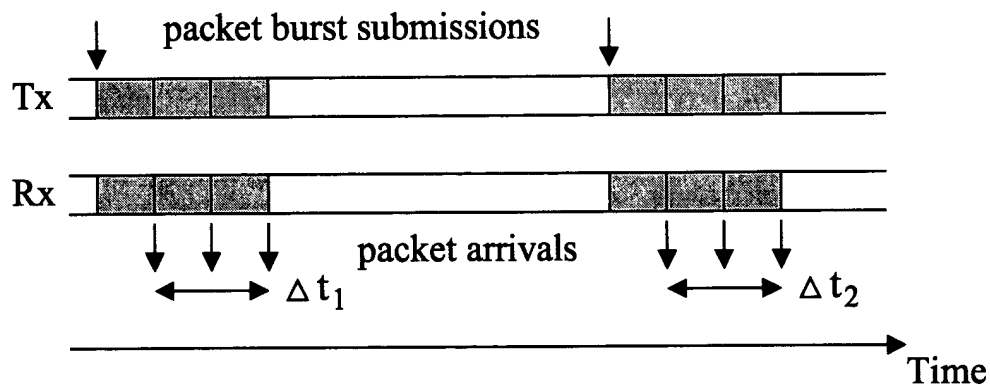


FIG. 24

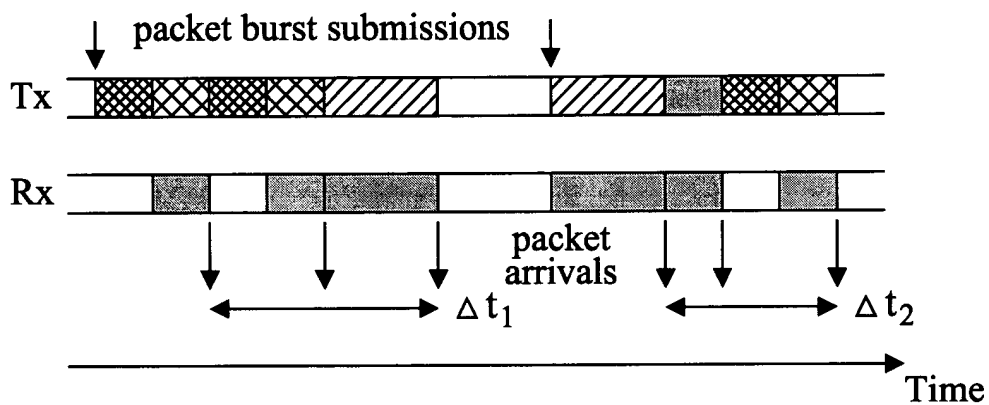
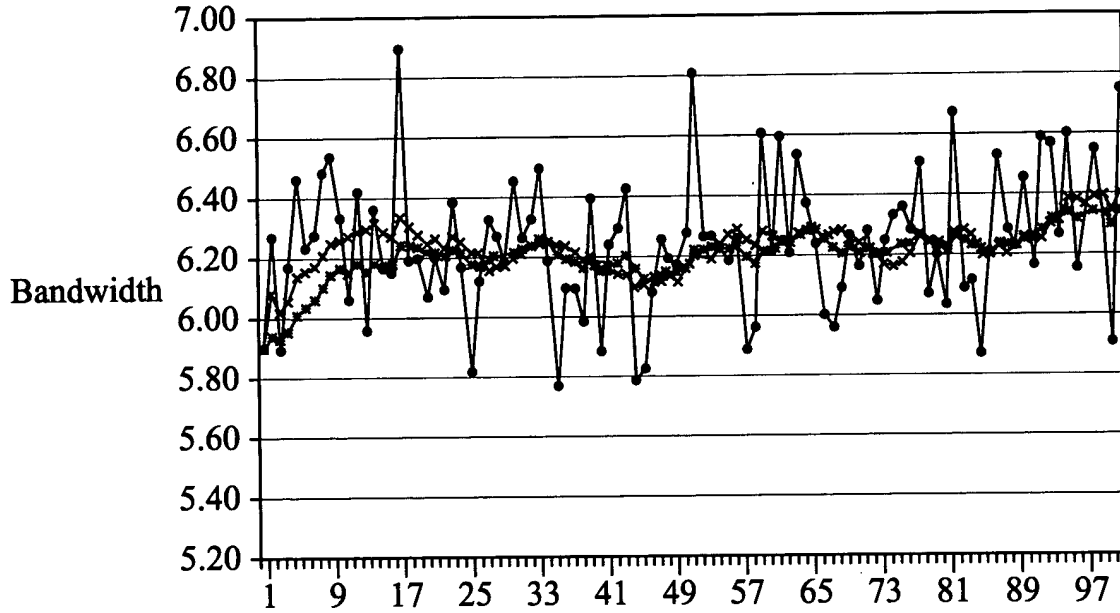


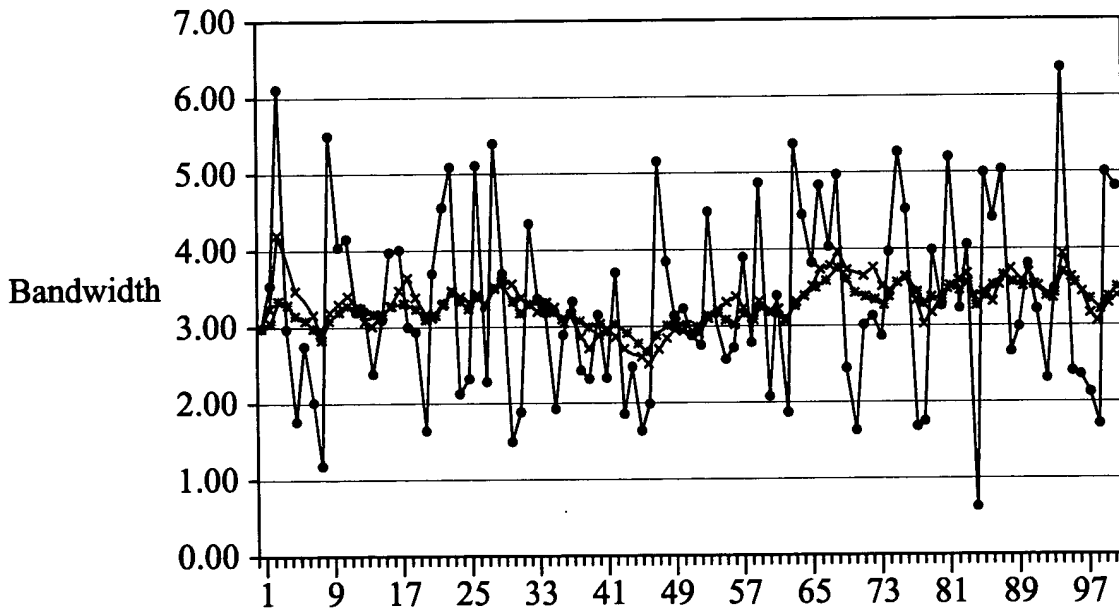
FIG. 25



Measurements of maximum throughput/bandwidth using the packet burst method in ideal conditions.

—●— Bandwidth  
- - - × - - - 10-point average  
—×— IIR(0.1)

FIG. 26



Measurements of maximum throughput/bandwidth using the packet burst method in non-ideal conditions.

—●— Bandwidth  
- - - × - - - 10-point average  
—×— IIR(0.1)

FIG. 27



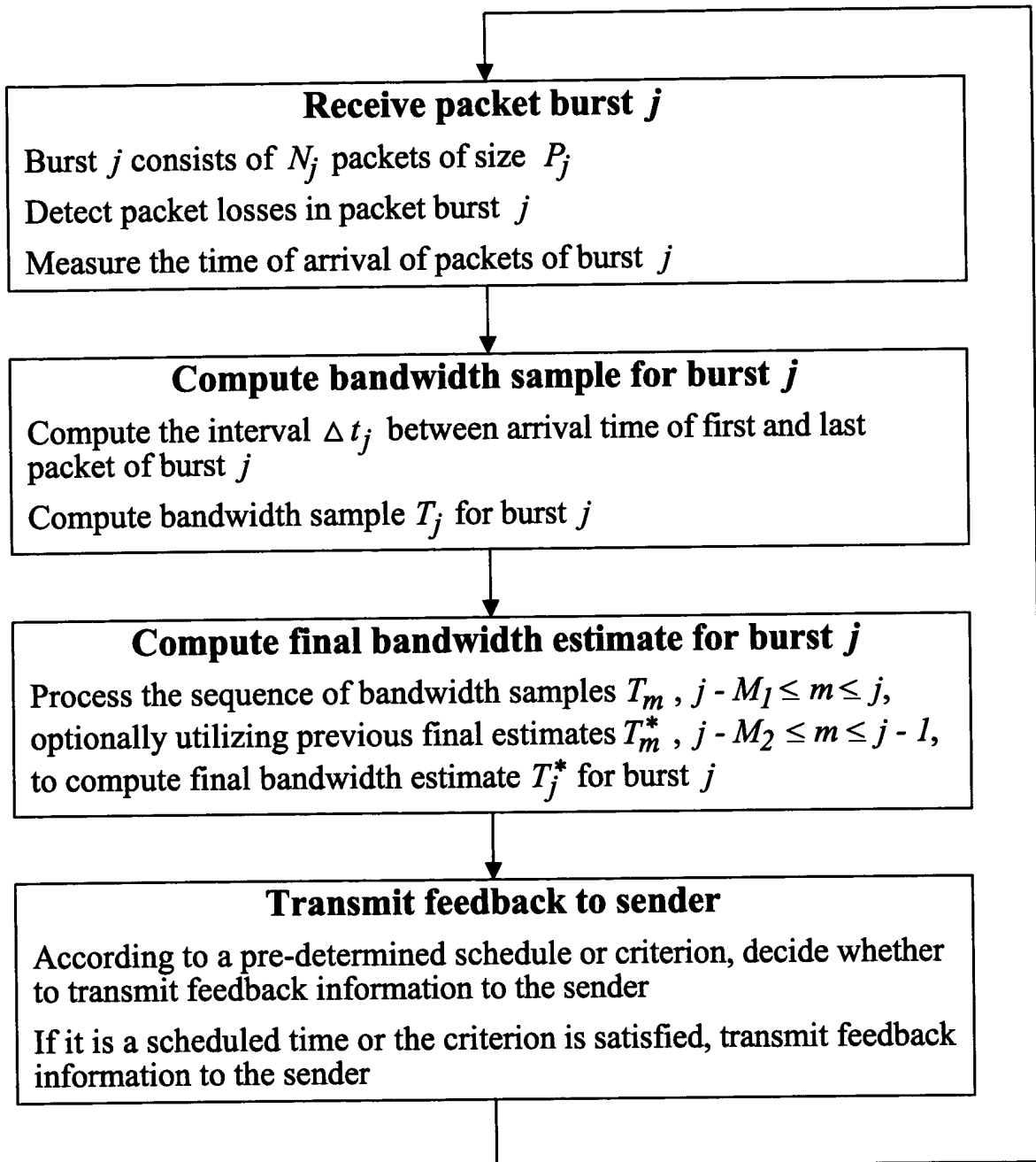


FIG. 28A

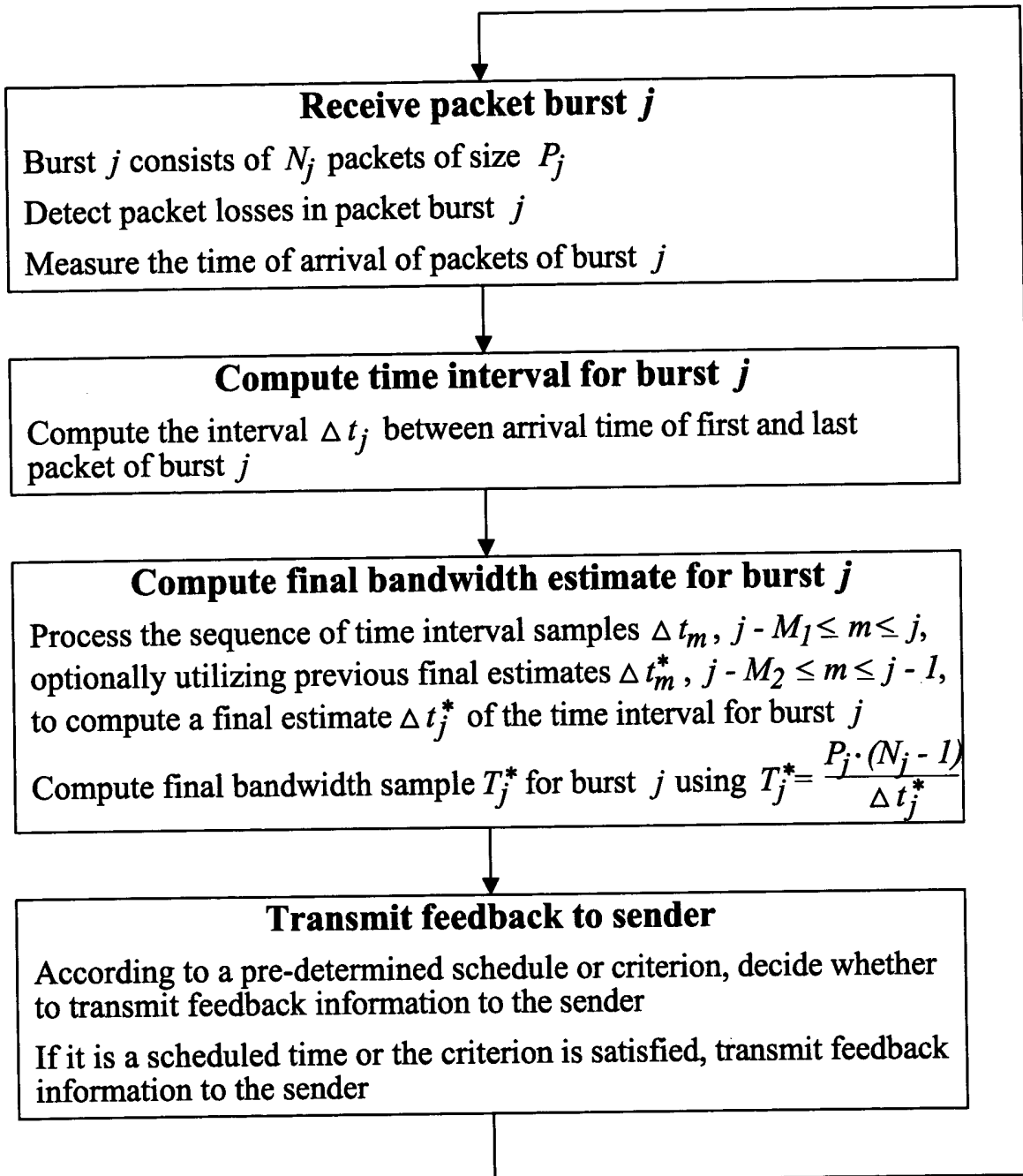


FIG. 28B

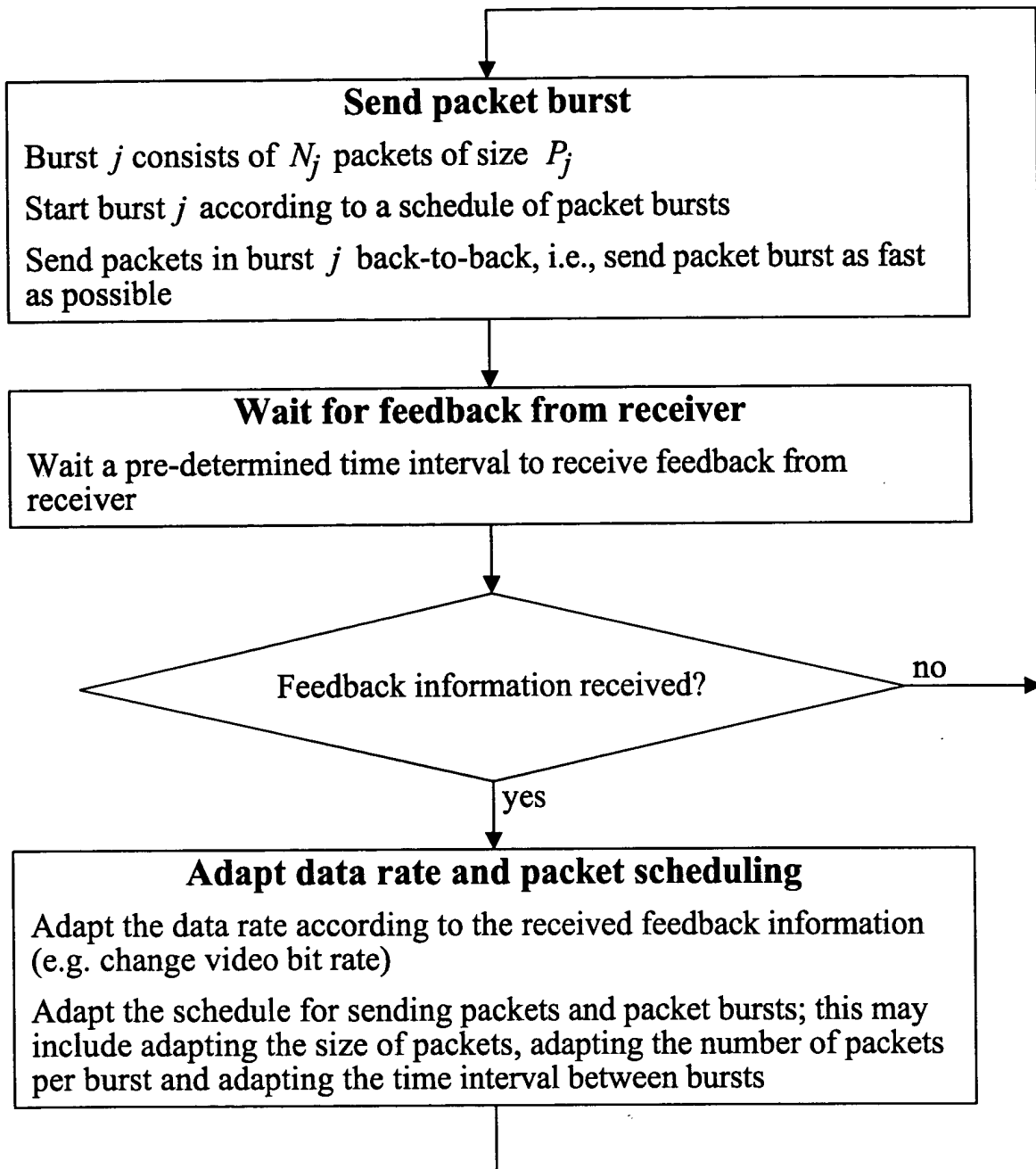


FIG. 29